6. FINDINGS, SUGGESTIONS AND CONCLUSION

The bibliometric studies are frequently used to assess the research publications and to generate information that could be used by policy makers and experts. This study has proven to be the useful tool in the assessment of research publication of scientists in Engineering and Technology. Taking into account the Scientist’s participation in scientific collaboration, publication and productivity pattern have been calculated. The present study illustrates with facts and figures on the scientific publication of Engineering Scientists in the journal ‘IEEE Transactions on control systems Technology’ during the study period.

The wider application of bibliometric techniques is leading to the development of a new and more precise technique hopefully; the ongoing theorist work would point the way to more innovate techniques. Moreover the present study mirrors the actual published results of the work of scientist in the journal ‘IEEE Transactions on control systems Technology’ during the study period.

➢ The Findings of the present study leads to the following observations:
The Findings of Year wise distribution of total publication of the journal ‘IEEE Transactions on control systems Technology’ is with the pace of gradual growth in the starting period. Yet there is a decreasing and increasing trend from the year 2001. The range of articles published per volume during the period under study is between 69 and 108. The study has examined that totally 935 articles have been published for the span of 10 years.

- The findings of relative growth rate and doubling time for research publication of scientists reveal the following facts: The analysis of the growth of contributions by the scientists reveal that the relative growth rate of publications have shown an increasing trend; contrastingly the doubling time of publications have decreased remarkably.

- The findings of year wise distribution of total contribution vs. total volume pages convey the following facts: the growth of total contribution is increasing from 69 to 93. From the year 2001, there is a fluctuation in the number of contributions and there is an increasing trend in the contribution from 2004 to 2006. Similarly total research publication pages are also increasing steadily from 2001. The result reveals that quantum of contribution is 935 and the
quantum of pages is 9512. And the average number of pages is accounted as 10.

- The findings of Relative growth rate and doubling time for the total number of pages reveals the following facts: The relative growth rate for the total research publication pages has shown an increasing trend. Contrastingly the doubling time for the pages shown a decreasing trend.

- The findings of country wise distribution of authors reveal that on the whole 2767 authors belonging to 55 countries contributed a total of 935 articles, 1079 (40.32%) of authors are geographically affiliated to USA followed by Italy with 153 (5.72%) and Canada with 143 (5.34%) and U.K with 123 (4.6%) and France and Taiwan with 119 (4.45 %) contributions. The remaining 940 (35.12 %) of authors are from 49 countries.

- The findings of Continent Wise distribution of authors focus on the following facts: On the whole 2676 authors belonging to 55 countries contributed a total of 935 articles. It shows that 1424 (52.91%) of the authors are geographically affiliated to continent of America followed by Europe with 626 (22.45%) and Asia with 560 (22.35%) and Australia with 55 (2.09%) and Africa gets the last place sharing 11 (0.2%) of authors.
The findings of authorship pattern on contribution focus on the following facts: The scientific publication in ‘IEEE Transactions on Control systems Technology’ during the study period intends to take collective participation in article publications. It has been proved from the study that single author papers have declining trend, supported by the Co-efficient variation as 14.56 percent for the two author contributions whereas for single authored contribution it is 46.18 percent.

The findings of ranked list of most prolific contributor reveal the following facts: Mr. S. O. Reza Mohemani was with the school of Electrical Engineering and computer science, The University of Newcastle, is ranked top with 21 different publications in Engineering and Technology. Mr. Anna. G.Stefanopoulou is with the school of Electrical Engineering and computer science, The University of Newcastle, is ranked second with 11 papers. The third rank goes to Mr. Dennis. S.Bernstein have published 7 papers each.

The Findings of productivity of authors based on Lotka’s law brings out the following facts: The analyzed data regarding author productivity will validate the lotka’s findings. The proportion of all contributions that make a single contribution is above 60 percent .On the whole, the present observation will satisfies the lotka’s law of
scientific productivity and it supports the fact that as the number of contribution increases, the number of author decreases.

- The Findings of author productivity on scientific research reflect the following facts: A greater level of paper publication is noted among few scientists. Out of various number of contributions, the highest number of contribution is 21 papers, which is the productivity of one individual scientists followed by 11 papers, and 7 papers and so on. One paper contribution constitutes 85.4 percent of the total output. From 2 to 4 paper contribution constitutes 14.17 percent and the authors who have contributed 5 to 21 papers constitute 0.43 percent alone. It supports the fact that when the number of published papers increases, the number of contributed author decreases.

- The findings of single vs. multiple authored output, put forth the following facts: among the total publications of ‘IEEE Transactions on Control systems Technology’ during the study period, multiple authored papers dominate with the high percent of 94.11. The single authored papers are less, which reflect the fact that the group activity in research and problem solving activities in the field of science and Technology are high.

- The findings of degree of collaboration in paper publications and in citations referred enlighten the following facts: the degree of
collaboration has shown an increasing trend from one phase of the period to other phase of the period. This brings out clearly the high level of prevalence of collaborative research in the field of control system Technology.

➢ The findings of Year wise distribution of authors by Membership reveals the following facts: On the whole 2676 authors IEEE Member shares 751 (28.06%) out of total 2676 authors during the study period. A Non-IEEE member shares 71.94% of total authors during the study period. It also shows the dominance of Non – IEEE authors

➢ The Findings of distribution of authors according to Academic and Non Academic Institution put forth the following facts: Out of Total 2676 authors, 2190 or 81.84% of authors are from Academic Institutions and the remaining 486 or 18.16% of authors are from industries.

➢ The Findings of most productive institution are none other than the institution that publishes the journal under study, namely University of California, USA. The number of author affiliated to this institution-totaled 98. The next most prolific institution is The University of Michigan, Ann Arbor, USA with 76 authors.
The Findings of distribution of authors by Gender reveals that out of total 2676 authors, 2521 or 94.21% of authors are male and the rest of 155 or 5.79% of authors are female. It indicates the lack of contribution of female authors in the journal article.

The Findings of distribution of articles by Gender reveals the following facts: Out of the total 935 articles, 808 (86.42%) of articles are contributed by only male authors. Female authors have contributed only 4 (0.43%) articles. In collaboration with male authors Female authors have contributed 123 (13.15%) of articles.

The Findings of Acknowledgement and Appendix in the articles reveals that out of Total 935 articles, 351 or 37.54% contained formal acknowledgement. On the other hand, only 150 or 16.94% contained appendix or appendices indicating the lack of habit on the part of the researchers to furnish additional information.

The Findings of Year wise distribution of citations reveal the following facts; the findings of Year wise distribution of total citations shows gradual growth from 2001. The study has examined totally 20579 citations published for the span of 10 years.

The findings of journal articles cited as references are 48.91%. The other form of references is 51.09%.
➢ The Findings of single vs. multiple authored citations, picturizes the following facts: Among the total citations of ‘IEEE Transactions on Control systems Technology’ during the study period, multiple authored papers dominate with the high percent of 75.94. The single authored papers are 24.06 %, which reflect the fact that the group activity in research and problem solving activities in the field of science and Technology are high.

➢ The Findings of the comparative study of authorship pattern in the journal cited with the book cited reveals the following facts: The joint authorship is encouraged in the journal publication and this is contrary in the book publication. Nearly half of the total books cited are single authored one. Yet, this has totally changed in journal publication a nearly half of the total publications encourage two authored publications.

➢ The Findings of the individual journal ranking enlighten the following facts: There are 35 ranks in the cited journal. Among them ‘IEEE Transactions on Automatic Control’ shares the first place of 24.9%. The ‘IEEE Transactions on Control systems Technology’ shares 21.42% and takes the second rank. Third rank is occupied by ‘IEEE Control system Magazine’, which shares 9.04%.
The Findings of Journal Self-Citation portrays the following: The Overall journal self-citation is 39.89%. This means that the journal commands great respect in its own field and attracts articles pertaining to the high profile areas of research.

The Findings of Author Self-Citation put forth the following: The Overall author self-Citation is 87.7%. This indicates that the authors are more interested in self-citing their own work.

The Findings of Obsolescence of journals cited reveals that half of the total 20579 citations, which works out to 10289 are approximately 7 years old. Hence, Half-life period is calculated as 7 Years.
SUGGESTIONS AND CONCLUSION

A correct estimation of the significance of research carried out is the necessary element of self-knowledge of the scientific community. Scientometric indices allow one to study temporal variations in the scientific productivity in the qualitative and quantitative aspects (for a separate researcher and for an institute in general), subjects of research, nomenclature and core of the journals used to publish the results, citations of publication and their impact on the community, etc. This study attempts to identify the Scientometric characteristics of the articles published in the journal IEEE Transactions on Control Systems Technology during the study period 1998-2007. Conclusions drawn from this study are:

- For the span of 10 years the productivity of the article and the publication pages of the article gets doubled. So the growth rate of the journal gets doubled for the succeeding years.

- IEEE members contribute 30% of the journal articles and Non IEEE Members contribute the remaining 70% of the journal articles, which leads to raise the standard and the popularity of the journal among the society.

- In collaboration with Male authors, female authors have contributed only 13% of journal articles. There is a need for intensive concentration of female authors to contribute more in this journal.
The analysis of continent wise distributions shows that Africa has contributed only 0.2%. The government of Africa should allocate more funds to improve research activities and there is a need to encourage and motivate collaborative research activities for paper publications. The funding agencies should allocate equal number of projects to all the institutions and research stations world wide irrespective of demand and request.

Out of total 2676 authors 18% of authors are from industries and the rest of the authors are from Academic institutions. There is a need to give special training program’s to develop the efficiency and caliber among the scientists in industries to pursue their research activities. Considering the motivation and efficiency of the researcher, it is imperative that they have to be provided with more infrastructure facilities for research.

It should be kept in mind that the data presented in this paper embrace only a part of the scientometric information collected by present. Surveying the literature of scientometrics one can conclude that there are no ready recipes for scientometric evaluations; each system has its own characteristics. Scientometric researchers are exploring features of information processes in scientific research but are far from finding the solution to all problems. Scientific research is a social organization; therefore the possibility for a description by quantitative methods has more limitations than in the field of natural sciences.